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developed to date and finally putting them in drawing form. Site plans, floor plans, elevations and major building sections are developed. Drawings can be confusing to the layperson; use of three-dimensional presentation models help participants other than architects understand the project. These models also allow you to explore visibility and other issues.

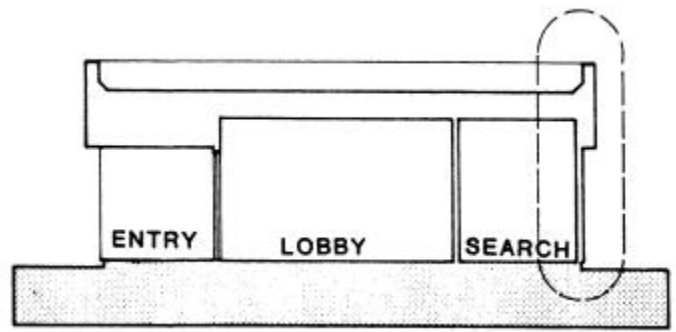
During schematic design, three major considerations arise which will affect the cost of your project:

The size of the building

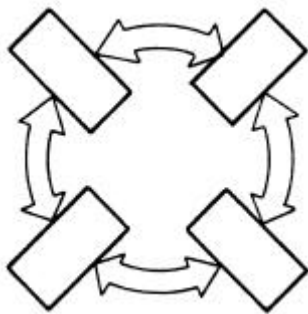
The shape of the building

What the building is made of

If the building design is larger than originally programmed, an irregular complex shape and constructed of expensive building systems, the cost of your project could double at this point. Once the size, shape and primary building systems are established, a 25 percent increase in budget would be substantial. Remember, the further into a project you get, the less impact you have on its cost!



BUILDING SECTION

SIZE

Your jail/hall will equal the sum of its parts, right? Wrong, No matter how good your designer is, no matter what layout or building type is selected, a lot of space will be taken up with nonfunctional items such as corridors within components (e.g. within your infirmary); corridors connecting components (e.g. housing to recreation); staircases and elevators; mechanical, electrical, heating/ventilating/air conditioning systems, walls, and structural members, such as columns. (Note: Some programmers also include janitor closets, restrooms and lobbies as nonfunctional space.) This space has been estimated in the PS and the architectural program.

In a detention facility, nonfunctional space can consume 40 percent or more of the total area. If your jail contains 100,000 square feet of usable space (net square feet), its total area (gross square feet) could be 140,000. If your average cost per square foot is \$100, your county is paying \$4 million for nonfunctional space. Considering the total construction cost of \$14 million, \$4 million is quite a big chunk. What would you prefer to spend that money on?

Obviously you can't recoup all of that money because nonusable space is as unavoidable as death and taxes, But you can help limit the amount of that space. One proven method is using campus plans that put most inter-component circulation space outdoors. Another approach is to build two-tier housing modules, rather than one, where much circulation will take place in one central dayroom rather than in networks of corridors.

Shape

The most material-efficient means of enclosing space is a circle. But since constructing round buildings is a contractors nightmare, a square or a fat rectangle is the most economical means of enclosing space. Very large squares and rectangles rarely allow natural light into all spaces where required. For example, strategically placed skylights in dayrooms can offer sufficient light for cells/rooms too. So, moderately large squares, rectangles,

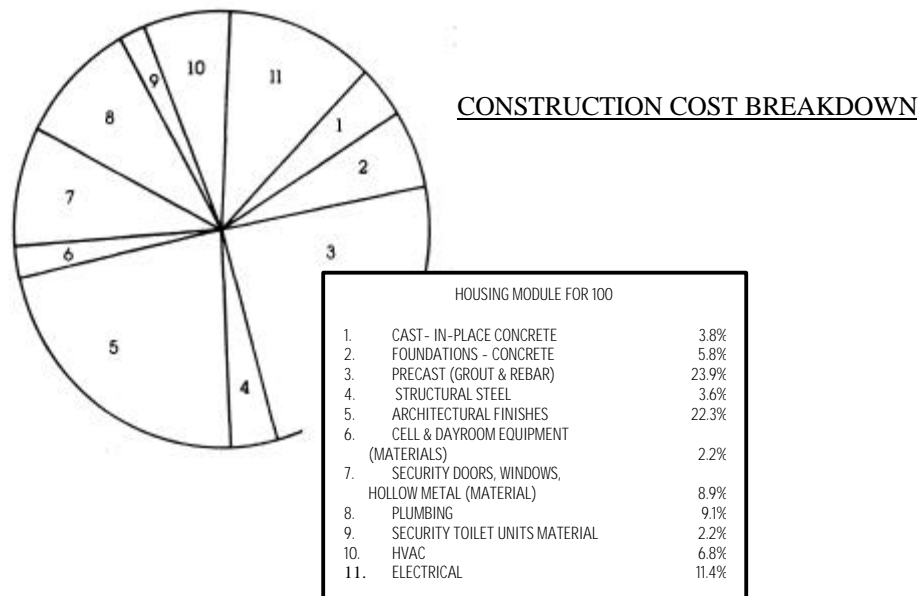
or cross-shapes are often the most efficient and workable shapes. Of course, the size and shape of your site and whether your facility will be connected to an existing building also will influence its shape.

To economize, keep your configuration simple. **Line of sight is extremely important in correctional facilities.** Complicated shapes generally translate to more wall surface, and every corner and unusual form drive up cost. Also, consider your building height. Meet codes, but avoid unnecessary ceiling heights. You should recognize, though, that two-tiered housing modules are generally economical. They provide dayrooms that are one-and-one-half to two stories high.

Building Systems

Primary building systems should be finalized during schematic design. Because of the specialized nature of designing a secure environment, selecting these systems has a greater impact on cost than when selecting them for an office building. Items such as interior walls, windows, doors, plumbing fixtures and communication systems generally cost more in a facility with strict security needs.

(See the outline of building systems in the Major Cost Component Value Matrix at the end of this Handbook for a more thorough discussion of these systems.)



When selecting materials to meet your security needs, make sure that these materials are to be used in the secure areas only. The costs of items such as doors and toilet fixtures for high security areas versus those for non-

secure areas can vary by as much as 500 percent. Selection of components appropriate to each particular use area is one of the best ways to save money during schematic design; failure to do so is one of the most common ways to drive up costs. But don't go overboard. Too many types of materials increase labor costs.

Local Building Methods

If you hire an outside design firm, make sure the architects are aware of local building practices when they select the construction methods of the structure and wall systems. If you haven't seen any other buildings in your area constructed using the same methods as those chosen by your architect, chances are you will pay more for your building than necessary. You also may inadvertently be excluding local construction firms from your project.

Building Codes



Although provisions to meet applicable building codes should have been considered prior to schematic design, this is when code considerations prove most important. A thorough code analysis of your project is mandatory because many design features affecting cost will be determined by interpretation of building codes.

You may wish to go through the project with the local building inspector and fire marshal. This exercise is valuable in helping them become familiar with your project at an early stage. **Consultation with the State Fire Marshal representative assigned to the Board of Corrections is required and will be very useful. Another set of trained eyes can look for code requirements not already addressed - preferable to being confronted later in the project with expensive redesign or finding solutions to a problem which could have been avoided.**

The building inspector and/or fire marshal also can help spot overly conservative interpretations of the code. Because the building code is a complicated document subject to interpretation, the easiest solution for a designer, in terms of time and liability, is to choose the most conservative and simple approach to applying the code to your project. Oftentimes, an equally safe but much less expensive solution can be reached with more research and thoughtfulness in applying the codes to a project.

Fire and life safety requirements of the code affect jail design and cost considerably because correctional facilities involve limiting an inmate's ability to quickly exit from a building. Remember, however, consideration also should be given to all areas within the building that are not

locked. **Do not assume that stringent code requirements for locked portions of the building should apply to areas such as administration, maintenance, kitchens and laundries.** In some cases, particularly for very small detention facilities, having separate areas of the building with different building systems can increase costs.

Schedule And Bidding Strategies

At schematic design, it is critical to revisit the scheduling assumptions made earlier. Also essential is refining or developing the contracting strategies you intend to use. Drawings and specifications will be developed based on your bidding strategy. For instance, a lump sum general contract requires one set of bid documents, whereas a phased or sub-contracted project requires more than one set. This strategy should be finalized before proceeding into design development. Changing strategies once the drawings and specifications are being prepared may require additional work by the architect. (See Section III.H, Construction, for a description of alternative bidding strategies.)

Cost Analysis/ Decision-Making

At this point, the building components as drawn need to be quantified and costs must be attached in order to verify the budget. Once again, check the sizes of the spaces within the building against previous projections. Also check to see if the actual quantities and types of materials match the cost of previous projections. (Depending on the level of detail and sophistication applied to cost projections in earlier phases, quantities of materials may or may not have been projected. Doing so now is a must.)

Any differences between previous cost estimates and those conducted during schematics should be easy to detect and trace if your cost control report has been kept up to date. Did your building get bigger? Did the quantities of materials required to enclose the building increase because of a complex configuration or additional stories? Were the assumptions about or qualities of materials different? Has additional equipment been included or was any other change of scope made?

After reviewing these questions, reasons for cost changes should become apparent. Once again, decisions about where to put the money must be made. Only by being involved in the project and knowing where the dollars are can the project be brought back in line without losing something you really want to include.

SCHEMATIC DESIGN

1. Do you understand how the building and site will function from the drawings and models presented?

☐ **Yes**
☐ **No**
☐ **Not Sure**

2. If this was your last chance to modify the plans, would you approve them? (As the owner, you can always change the plans, but after schematic design each change costs more time and probably more money.)

☐ **Yes**
☐ **No**
☐ **Not Sure**

3. Has the shape of the building been defined in terms of wall heights, room heights, exterior elevations?

☐ **Yes**
☐ **No**
☐ **Not Sure**

4. Does the size of the building match the program? (Remember, less of an inexpensive space does not balance with more of an expensive space.)

☐ **Yes**
☐ **No**
☐ **Not Sure**

5. Have the materials been selected for the structure, interior and exterior walls (at this point primarily based on security)?

☐ **Yes**
☐ **No**
☐ **Not Sure**

6. Has your construction manager, value engineer, cost analyst or all three reviewed your selected materials for consistency with the budget and local building methods?

☐ **Yes**
☐ **No**
☐ **Not Sure**

7. Have security door and toilet types been selected?

☐ **Yes**
☐ **No**
☐ **Not Sure**

8. Has the heating, ventilating and air conditioning system been defined in terms of concept? How about the water, sewage, power and telephone systems? (Which spaces have what requirements? For instance, is it a central boiler or numerous roof top units?)

☐ **Yes**
☐ **No**
☐ **Not Sure**

9. Has a building code review been completed?

☐ **Yes**
☐ **No**
☐ **Not Sure**

10. Have the variances between previous and current assumptions been noted and the cost impact documented?

☐ **Yes**
☐ **No**
☐ **Not Sure**

11. Is the project, as specified to date, within budget?

12. Has the cost control report been updated and variances documented?

13. Have you determined the cost of each building system and communicated these parameters to the designers of the respective systems?

14. Has your project schedule been updated?

15. Have you finalized your bidding strategies?